


Research Article

Herpetofauna of Laguna Blanca National Park, Argentinean Patagonia: species list and conservation status

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Abstract

Laguna Blanca National Park (LBNP) is located in the mid-west of Neuquén Province, Argentina. It was created in 1940 with the aim of conserving the nesting and breeding habitats of an important diversity of birds. Until now, there have been no exclusive works that address the herpetofauna present. The aim of this article is to provide an updated inventory of reptile and amphibian species in LBNP. We used four sources of information to create the species list: 1) data coming from field observations; 2) specimens deposited in herpetological collections; 3) scientific literature review; 4) online biodiversity databases. We confirm the occurrence of 18 species of herpetofauna in LBNP, including 13 reptiles and 5 amphibians. We also included six species with probable presence according to the range of distribution and habitat similarity. We added the conservation status of the national and international lists for each species. Five species are in some threat category at the national (Vulnerable, Endangered) or international level (Endangered, Critically Endangered). Seven taxa are listed as “Species of Vertebrates of Special Value” by the Administración de Parques Nacionales. Despite being protected within a national park, the herpetofauna present face threats such as prolonged drought events, habitat modification due to the presence of livestock, introduced exotic species, and emerging diseases. Conservation efforts are imperative to protect these species and mitigate their threats.

Key words: amphibians, biodiversity, inventory, Neuquén, protected areas, reptiles

Introduction

Laguna Blanca National Park (LBNP) is included in the Patagonian Steppe ecoregion, where plains with mostly smooth reliefs and extensive stepped plateaus prevail (Administración de Parques Nacionales 1999). It protects a particular sector of the Patagonian Steppe ecosystem, in the transition of the Western District and the Payunia District of the Patagonian Phytogeographic

Province (Oyarzabal et al. 2018). In addition, at the top of the volcanic cones, some species of the Altoandina Province grow (Morello et al. 2012). The convergence of these units gives this territory a unique conservation value, being underrepresented within the National Protected Areas system (Cibils and Borrelli 2005). In 1992, LBNP was declared a Ramsar site due to its importance as a feeding and breeding area for waterfowl. Besides, in 1995, it was declared one of the Important Bird Areas (IBAs) by BirdLife International, a global initiative program focused on the identification, documentation, and conservation of a network of critical sites for birds around the world (Administración de Parques Nacionales 2017).

Patagonia is recognized as a region with a significant concentration of endemic vertebrates (Lamoreux et al. 2006), with reptiles constituting a crucial element in the fauna (Morando and Avila 2020). Among reptiles, Patagonian lizards exhibit not just extraordinary species diversity but also a large number of endemisms (Chebez et al. 2005). The diversification of reptiles in arid environments is exemplified in Patagonia by the second-most diverse lizard genus, *Liolaemus* (Pincheira-Donoso and Scolaro 2007). Patagonian lizards represent approximately 8% of the whole diversity of lizards described for the Neotropics (Morando and Avila 2020). Regarding amphibians, the Patagonian region has a relatively small number of species; nevertheless, they possess attributes that grant them significant conservation value, such as a high degree of endemism (Úbeda and Grigera 2007).

There are documents that record the great diversity of birds within the park (Santos Gollan 1951; Paz Barreto 2018); nevertheless, there are still no exclusive works that address the herpetofauna present. At the regional level, there is a guide for northern Patagonian reptiles (Scolaro 2006), and Chebez et al. (2005) list the reptiles of Argentina's National Parks, including LBNP. Since then, new reptile species have been described within the park, such as *Liolaemus purul* (Abdala et al. 2012a) and *Phymaturus querque* (Lobo et al. 2010). Furthermore, other species were misidentified, such as *Diplolaemus darwinii*, whose presence is mentioned within the park (Chebez et al. 2005), but, according to Cei et al. 2003, the populations found in LBNP correspond to *Diplolaemus sexcinctus*. Another example is *Liolaemus boulengeri*, which is mentioned for the park by Chebez et al. 2005, but its occurrence in the area corresponds to *Liolaemus sagei* (Etheridge and Christie 2003). More than 15 years have passed since these reptiles' lists, and considering the newly described species, an update is necessary. Regarding amphibians, there is no scientific work that addresses all the species present in the park, but the Management Plan for LBNP (Administración de Parques Nacionales 2017) lists the species known to occur there (*Atelognathus patagonicus*, *A. praebasalticus*, *Pleurodema bufoninum*, *Rhinella arenarum*, and *R. papillosa*). Furthermore, there are various papers related to the threatened frogs *Atelognathus patagonicus* and *A. praebasalticus* (Gallardo 1962; Cei and Roig 1968; Fox et al. 2005; Cuello and Perotti 2006; Fox et al. 2006; Úbeda and Grigera 2007; Martinazzo Giménez 2011; Cuello et al. 2017).

The area has several endemisms for both amphibians and reptiles (i.e., *Atelognathus patagonicus*, *Atelognathus praebasalticus*, *Liolaemus purul*, *Liolaemus sagei*, *Phymaturus querque*, and *Phymaturus zapalensis*), many of which are in some category of threat (Abdala et al. 2012b; Giraudo et al. 2012; Vaira et al. 2012). One of the main objectives of Protected Areas is to maintain natural

conditions so that the species and biological communities they contain can thrive (Butchart et al. 2010). However, even within the park's boundaries, these species face various threats. Among the main threats faced by amphibians in LBNP are the presence of livestock that tramples the shores and drinks from the lagoons; exotic invasive fish; prolonged drought events increased by climate change; and the appearance of emerging diseases (i.e., ranavirus, chytridiomycosis; Fox et al. 2006; Cuello et al. 2014; Ghirardi et al. 2014). The main sub-population of the endemic frog *A. patagonicus* became extinct from Laguna Blanca lagoon, the largest and only permanent water body, after successive introduction events of invasive fish (Fox et al. 2005; Cuello and Perotti 2006; Ortubay et al. 2006; Kacoliris et al. 2022). In the case of reptiles, the threats they face within the park have not been studied yet but are probably related to habitat degradation caused by livestock activity and climate change (Böhm et al. 2016).

Knowing the species that occur in this area is the first step to conserving them. Checklists are an important tool to provide basic material for biogeographic and systematic studies, as well as information for decision-making in the management and conservation of wildlife (Droege et al. 1998). Herpetofaunal inventories should become a standard part of environmental assessment programs (Gibbons et al. 2000). The aim of this article is to present a complete current list of the amphibians and reptiles of the Laguna Blanca National Park in Argentinean Patagonia, with comments on the conservation status of each species.

Methods

Study area

Laguna Blanca National Park (39°2'14.81"S, 70°21'15.46"W) is located in the mid-west of Neuquén province, Argentina (Fig. 1) and includes an area of 11250 ha with an elevation of 1315 masl (Marcolín 1968). It was created in 1940 with the aim of conserving the nesting and breeding habitat of an important diversity of birds (Ramilo et al. 1993). The park gets its name from the largest permanent water body in the area, the Laguna Blanca (1700 ha), which is located mostly within its limits. In addition to this lagoon, eight others are located within the park, all much smaller and disconnected from each other, fed by underground infiltration and prone to desiccation in certain periods (Cei and Roig 1968). The occurrence of *mallines* is also notable. *Mallines* are wet meadows typically associated with river and stream courses or valley bottoms. In these areas, the high water availability determines a different physiognomy; the vegetation cover often exceeds 100%, and the dominant plants are mesophytic grasses (Poaceae, Juncaceae, and Cyperaceae) (Escobar 2011).

The terrain is rocky and rugged, with numerous volcanic cones interspersed with steep cliffs, basaltic walls, and rocky plains, dominated by the physiognomy of shrubby grassland steppe (Marcolín 1968). The climate is harsh, with hot, dry summers and cold, snowy winters (Conti 1998). The average annual temperature ranges between 8 and 10 °C, while the annual rainfall varies from 280 to 370 mm and is concentrated in autumn and winter (Administración de Parques Nacionales 2017). The aridity of the area where the park is inserted is attributed to climate and relief conditions as well as to the negative water balance derived from the scarcity of rainfall and high evapotranspiration (Daciuk 1968).

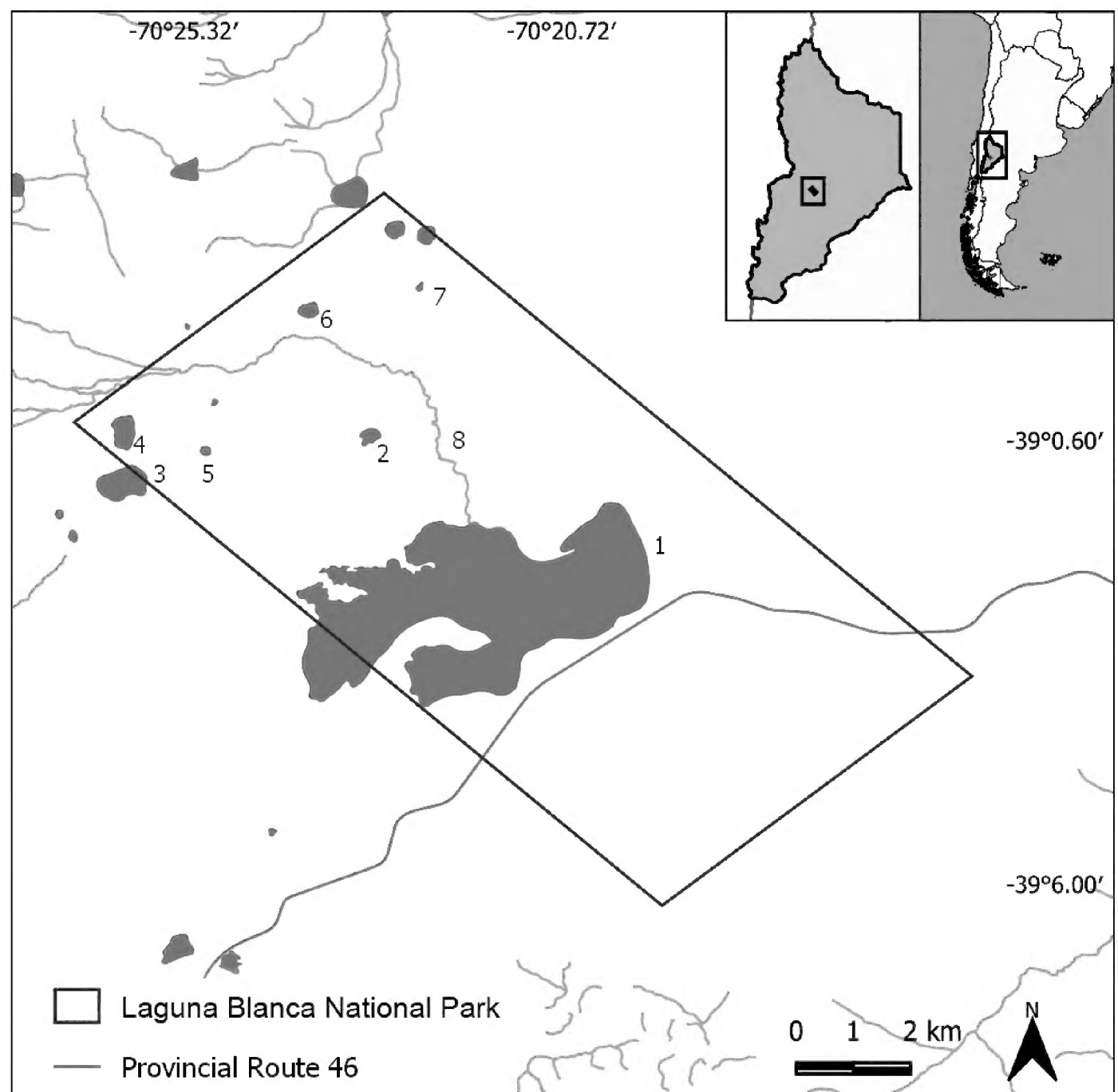


Figure 1. Laguna Blanca National Park in Neuquén Province, Argentina. **1** Laguna Blanca **2** Laguna Verde **3** Laguna del Overo **4** Laguna del Hoyo **5** Laguna del Molle **6** Laguna Antiñir **7** Laguna Jabón **8** Llano Blanco Stream.

The vegetation is typical of steppe, low-growing, and thorny, characterized by “coirones” (*Pappostipa humilis* and *P. speciosa*), “neneo” (*Mulinum spinosum*), “molle” (*Schinus marchandii*), and “jarillas” (*Larrea* spp.) (Bonvissuto et al. 2008). Many of the plant species are endemic (e.g., *Adesmia neuquenensis*, *A. sandwithii*, *Heliotropium pinnatisectum*, *Nassauvia hillii*, *Senecio steparius*, *Viola columnaris*, and *V. escondidaensis*). Fifteen percent of the total species are exotic, and their presence within LBNP is related to grazing land use (Escobar 2011).

Data collection

We used four sources of information to create the species list: 1) records from field observations; 2) voucher specimens and pictures deposited in the following collections: LJAMM-CNP (Luciano Javier Avila Mariana Morando Herpetological Collection, Centro Nacional Patagónico, Puerto Madryn, Argentina), MACN (Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina), MLP (Museo de La Plata, La Plata, Argentina), FML (Fundación Miguel Lillo, San Miguel de Tucumán, Argentina); 3) review of the scientific literature; and 4) online biodiversity databases. We also included species with probable presence according to the distribution range (up to 100 km according to the IUCN

distribution maps) and habitat similarity. We add the conservation status of the national and international lists for each species.

For field records, we conducted surveys from October 2022 to March 2023. Four researchers carried out visual encounter surveys during the spring and summer at the following sites: Laguna del Hoyo (39°0'29.46"S, 70°26'1.68"W); Laguna del Overo (39°0'58.78"S, 70°25'53.92"W); Laguna del Molle (39°0'43.99"S, 70°25'3.42"W); Laguna Antiñir (38°59'2.46"S, 70°23'49.64"W); Laguna Jabón (38°58'43.94"S, 70°22'27.10"W); Laguna Verde (39°0'33.68"S, 70°23'1.85"W); Laguna Batea (39°2'3.71"S, 70°24'34.05"W). We also performed transects between lagoons and the Llano Blanco Stream. We searched for amphibians and reptiles on the shores of each lagoon for three hours, while each transect was tracked for two hours (totaling 223 hours per person). Fig. 2 shows the main types of environments sampled.

We reviewed varied literature, including checklists for Argentina and National Parks (Chebez et al. 2005; Avila et al. 2013), field guides and books (Scolaro 2006; Morando and Avila 2020; Abdala et al. 2021; Williams and Vera 2023), and other scientific articles (Etheridge and Christie 2003; Cei et al. 2004; Lobo et al. 2010; Abdala et al. 2012a). Furthermore, we gather data from the Administración de Parques Nacionales, such as the Management Plan for the Park (Administración de Parques Nacionales 2017).

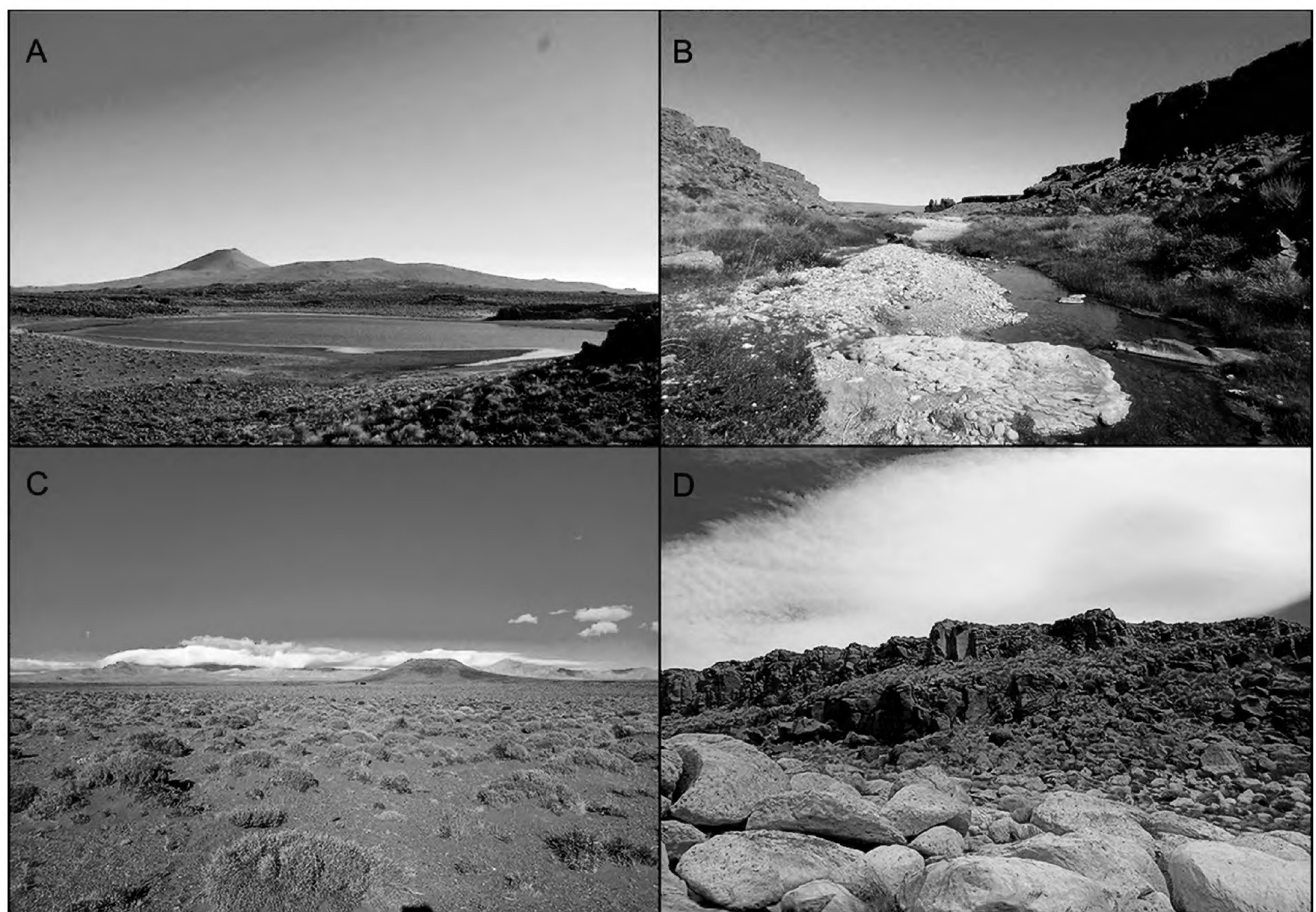


Figure 2. Environments sampled in the Laguna Blanca National Park **A** Basaltic lagoon (Jabón) **B** Llano Blanco Stream **C** Shrubby grassland steppe; **D**. Rocky areas.

We inspected the following online databases: iNaturalist (<https://www.inaturalist.org/>), Ecoregistros (<https://ecoregistros.org/site/index.php>), GBIF (<https://www.gbif.org/>), and IUCN (<https://www.iucnredlist.org/>). We filtered the records, discarding those whose photographs did not allow us to identify the species.

We followed Uetz et al. (2023) for the nomenclature and systematics of reptiles and Frost (2023) for amphibians. We followed the IUCN Red List for conservation status at the international level (<https://www.iucnredlist.org/>). The national conservation status for each species was obtained from the Argentinian Conservation Status Categorization for lizards (Abdala et al. 2012b), snakes (Giraudó et al. 2012), and amphibians (Vaira et al. 2012).

Results

We documented a total of 18 herpetofauna species in LBNP, with 13 reptiles and 5 amphibians (Table 1; Fig. 3), all of which have corresponding records in the consulted bibliography. Among the voucher specimens examined from scientific collections, we found all these species except *Leiosaurus bellii*. However, our field surveys revealed only 12 species (10 reptiles and two amphibians). Finally, online databases provided records for 16 species (12 reptiles and four amphibians).

Reptile species are distributed into six families, viz., Amphisbaenidae, Colubridae, Leiosauridae, Liolaemidae, Phyllodactylidae, and Viperidae, whereas amphibians are included in three families: Batrachylidae, Bufonidae, and Leptodactylidae. The richest group are lizards (61%), followed by anurans (28%) and snakes (11%). The greatest herpetofauna richness was found near the lagoons.

Out of the 18 confirmed species, five are in some threat category at the national or international level: three reptiles (as Vulnerable) and two amphibian species (as Endangered, Critically Endangered, and Vulnerable). Threatened species represent 28% of the total species documented for the park. We included six probable species: two lizards, one amphisbaenian, and three snakes.

Table 1. List of reptile and amphibian species from Laguna Blanca National Park, Argentina. Presence: C (confirmed species); P (probable species). Source of information: A (bibliography); B (museum database); C (field survey); D (online database). Conservation status: CR (Critically Endangered); EN (Endangered, En Peligro); IC (Insuficientemente Conocida); LC (Least Concern); NA (No Amenazada); VU (Vulnerable). Dashes correspond to species not recorded during sampling.

Taxon	Presence	Source	Environment	Conservation status (global/argentine)
Order Squamata				
Family Leiosauridae				
<i>Diplolaemus sexcinctus</i>	C	A, B, C, D	near lagoons	LC / NA
<i>Leiosaurus bellii</i>	C	A	–	LC / NA
<i>Pristidactylus araucanus</i>	C	A, B, C, D	shrubby grassland steppe	LC / VU
Family Liolaemidae				
<i>Liolaemus bibronii</i>	C	A, B, C, D	near lagoons, shrubby grassland steppe	LC / NA
<i>Liolaemus elongatus</i>	C	A, B, C, D	near lagoons, rocky areas	LC / NA
<i>Liolaemus kriegi</i>	C	A, B, C, D	near lagoons, rocky areas	LC / NA
<i>Liolaemus lineomaculatus</i>	P	D	–	LC / NA
<i>Liolaemus purul</i>	C	A, B, D	–	LC / NA
<i>Liolaemus rothi</i>	P	D	–	LC / NA
<i>Liolaemus sagei</i>	C	A, B, C, D	near lagoons, shrubby grassland steppe	LC / NA
<i>Phymaturus querque</i>	C	A, B, C, D	rocky areas	LC / VU

Taxon	Presence	Source	Environment	Conservation status (global/argentine)
<i>Phymaturus zapalensis</i>	C	A, B, C, D	rocky areas	LC / VU
Family Phyllodactylidae				
<i>Homonota darwinii</i>	C	A, B, C, D	rocky areas	LC / NA
Family Amphisbaenidae				
<i>Amphisbaena plumbea</i>	P	D	–	LC / NA
Family Colubridae				
<i>Paraphimophis rusticus</i>	P	D	–	LC / NA
<i>Philodryas patagoniensis</i>	C	A, B, C, D	near lagoons, shrubby grassland steppe	LC / NA
<i>Philodryas trilineata</i>	P	D	–	LC / NA
<i>Tachymenis trigonatus</i>	P	D	–	LC / IC
Family Viperidae				
<i>Bothrops ammodytoides</i>	C	A, B, D	–	LC / NA
Order Anura				
Family Batrachylidae				
<i>Atelognathus patagonicus</i>	C	A, B, C, D	near lagoons	CR / EN
<i>Atelognathus praebasalticus</i>	C	A, B	–	EN / VU
Family Bufonidae				
<i>Rhinella arenarum</i>	C	A, B, D	–	LC / NA
<i>Rhinella papillosa</i>	C	A, B, D	–	LC / NA
Family Leptodactylidae				
<i>Pleurodema bufoninum</i>	C	A, B, C, D	near lagoons, Llano Blanco stream	LC / NA

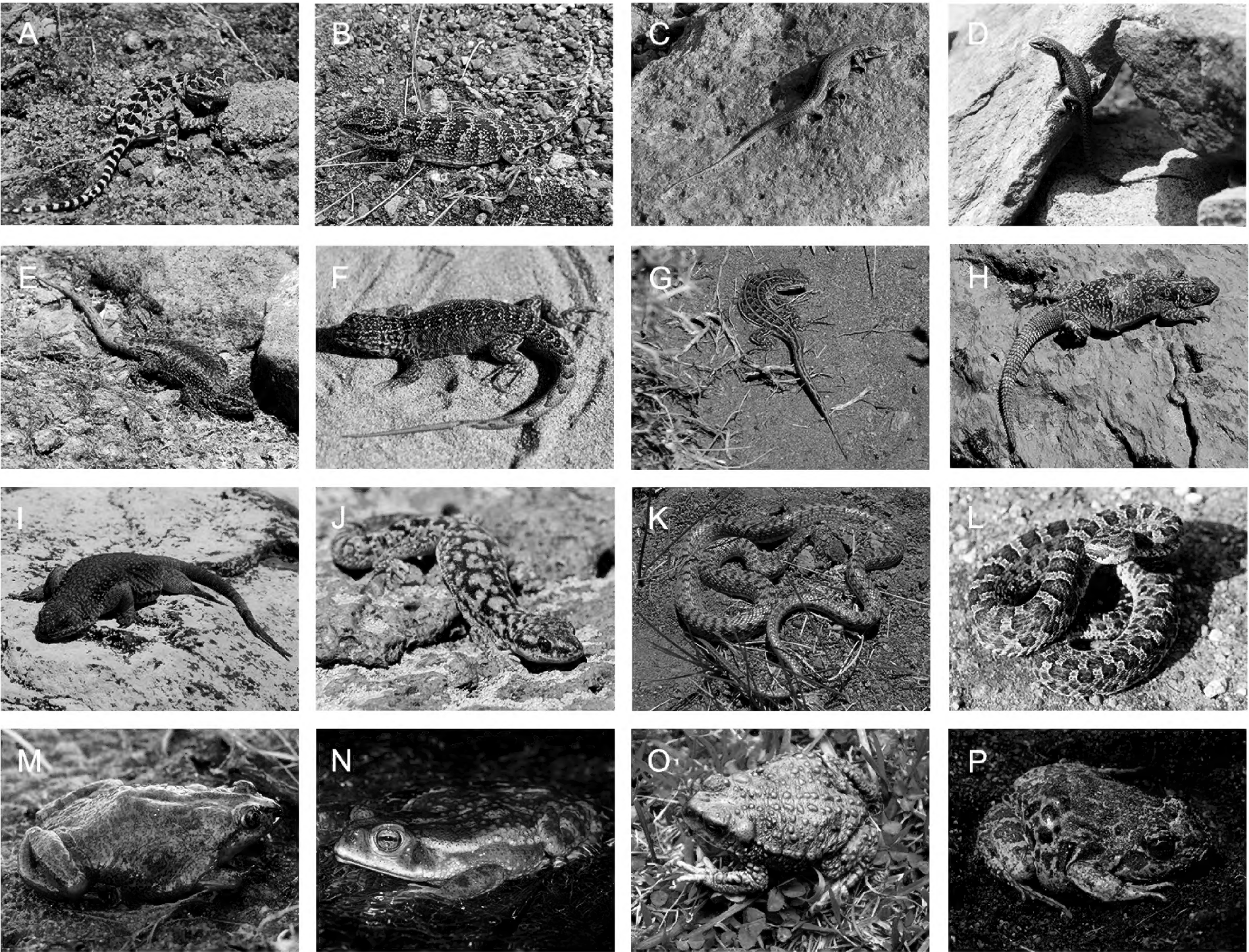


Figure 3. Reptiles and amphibian species of Laguna Blanca National Park, Argentinian Patagonia **A** *Diplolaemus sexcinctus* **B** *Pristidactylus araucanus* **C** *Liolaemus bibronii* **D** *L. elongatus* **E** *L. kriegi* **F** *L. purul* **G** *L. sagei* **H** *Phymaturus querce* **I** *P. zapalensis* **J** *Homonota darwinii* **K** *Philodryas patagoniensis* **L** *Bothrops ammodytoides* **M** *Atelognathus patagonicus* **N** *Rhinella arenarum* **O** *R. papillosa* **P** *Pleurodema bufoninum*.

Discussion

This work is the first checklist of reptiles and amphibians in Laguna Blanca National Park. We contributed to updating the checklist of reptiles from the National Parks of Argentina (Chebez et al. 2005), which also included 13 species, but many of them underwent changes in their taxonomy. Several species mentioned as confirmed for LBNP (Chebez et al. 2005; Administración de Parques Nacionales 2017) were excluded: *Diplolaemus darwinii*; *Pristidactylus scapulatus*; *Liolaemus boulengeri*; *L. darwinii*; *L. monticola*; *L. tehuelche*; and *Phymaturus palluma*, since they were assigned to new species or misidentified. *D. darwinii* would correspond now to *D. sexcinctus* (Cei et al. 2003); *P. scapulatus* to *P. araucanus* (Cei et al. 2001); and *P. palluma* to *P. querque* (Lobo et al. 2010). The *Liolaemus* genus species we excluded correspond to *L. purul* (Abdala et al. 2012a) or *L. sagei* (Etheridge and Christie 2003).

We included six species based on probable presence determined through habitat similarity and the distribution range obtained from the IUCN distribution maps (<https://www.iucnredlist.org/>). *Liolaemus lineomaculatus* is native to the Patagonian phytogeographic province, inhabiting open areas with shrub vegetation. It has been documented in the provinces of Santa Cruz, Chubut, Río Negro, and Neuquén, with a record near the park (Christie 2002). *Liolaemus rothi* occupies various steppe habitats, ranging from rocky river washes to grass-bush communities, featuring different types of vegetation in valleys, slopes, and plateaus (Etheridge and Christie 2003). This species is found in the southwestern Neuquén Province at altitudes ranging from 700 to 1800 masl (Etheridge and Christie 2003). *Amphisbaena plumbea* is primarily found in the Monte ecoregion, extending from the province of Salta to Chubut (Montero 2016); however, there are a few records in Zapala, a locality very close to LBNP (Montero 1996). *Paraphimophis rusticus* occurs in a wide range of shrubland habitats and is mentioned in the central Neuquén province (Pérez et al. 2012). *Philodryas trilineata* is present in many Argentine provinces (Catamarca, Chubut, Córdoba, La Pampa, La Rioja, Mendoza, Neuquén, Río Negro, Salta, San Juan, San Luis, and Tucumán), mainly in the Monte phytogeographic region (Williams et al. 2021; Vera et al. 2023). *Tachymenis trigonatus* inhabits xeric shrub steppe (Scolaro 2005) and is found in the Monte phytogeographic region, extending into neighboring areas, reaching the provinces of Buenos Aires, Catamarca, Chubut, Córdoba, La Pampa, La Rioja, Mendoza, Neuquén, Río Negro, San Juan, San Luis, and Santiago del Estero (Avila 2009; Giraudo et al. 2012; Vera et al. 2023).

Reptiles with a Patagonian distribution represent 33% of the country, while about 40% of the species are endemic to Patagonia (Scolaro 2006). Most of the endemisms are attributed to the genera *Liolaemus* and *Phymaturus* (Morando and Avila 2020). Of the approximately 50 lizard species in the Neuquén province (Avila et al. 2013), 12 (24%) are protected within the park. In the case of snakes, their specific richness is scarce; there are 15 species in the province (Williams et al. 2021), and only two species (13%) are confirmed in this protected area. Lizards constituted the group with the highest richness and abundance of individuals found in the field, with Liolaemidae being the most numerous family. *Liolaemus elongatus*, *L. kriegi*, and the two species of *Phymaturus* were found associated with rocky areas; *Liolaemus bibronii* and *L. sagei* were found in bushes with sandy substrates in the shrubby grassland steppe.

The genus *Phymaturus* is unique within the Argentine herpetofauna since all the species are vulnerable on the national red list (Abdala et al. 2012b) based on their highly specialized biology, lifestyle (saxicolous), reproduction (viviparous), and diet (herbivore). In this context, the LBNP gains additional relevance by protecting two species of this genus, *Phymaturus querque* and *P. zapalensis*. Several studies have explored various aspects of *P. zapalensis*, encompassing reproductive biology (Boretto and Ibargüengoytía 2009), field thermal biology (Ibargüengoytía et al. 2008), and thermal preferences (Cruz et al. 2009). Moreover, comprehensive research on the thermal physiology of both *P. querque* and *P. zapalensis* has been conducted with individuals found inside LBNP (Duran et al. 2018; Cabezas-Cartes et al. 2023). It would be interesting to carry out studies to determine the status of the populations within the park.

All genera of leiosaurids are represented in LBNP: *Diplolaemus*, *Leiosaurus*, and *Pristidactylus*. *Diplolaemus* is the only lizard genus that is endemic to Patagonia. Individuals of *D. sexcinctus* were found under the peripheral rocks of the lagoons. Of the four *Leiosaurus* species, only one is exclusive to Patagonia, *L. bellii* (Avila et al. 2013), and it occurs in LBNP according to Chebez et al. (2005). Nevertheless, we did not find any specimens of *L. bellii* during the samplings. *Pristidactylus araucanus* is a poorly known species, with few records of occurrence and probably unclear taxonomic status. Its population density is low, with apparently isolated populations (Abdala et al. 2012b). During sampling, we only found one individual near rocks on sandy substrates.

Regarding amphibians, Argentinean Patagonia harbors about 30 species, with the highest richness concentrated in northern Patagonia (Úbeda and Grigera 2007). Of the 18 species present in Neuquén province, five (28%) are found in LBNP. *Rhinella arenarum*, *R. papillosa*, and *Pleurodema bufoninum* are common species with wide distribution. Despite both species of *Rhinella* being common, they have not been observed during samplings. It may be useful to conduct additional searches on sites not visited in our studies. However, several individuals of *P. bufoninum* were found beneath rocks in the Llano Blanco stream and around the lagoons.

Atelognathus patagonicus and *A. praebasalticus* are endemic species that inhabit basaltic lagoons in the center-west of Neuquén province. *A. patagonicus* has the peculiarity of having two morphotypes, one aquatic and the other littoral (Ceí and Roig 1968). During samplings, we recorded individuals of *Atelognathus patagonicus* under rocks inside the lagoons and in peripheral areas. We were able to identify frogs exhibiting aquatic and littoral morphotypes.

The Patagonian Steppe is the ecoregion with the highest percentage (75%) of threatened amphibians in the country (Vaira et al. 2017). *A. patagonicus* was extremely abundant in the Laguna Blanca, the largest and only permanent water body (Péfaur and Duellman 1980), but from 1986 on it has not been observed at that site and was declared extinct for this lagoon (Fox et al. 2005). This situation is related to the introduction of invasive fish (mostly perch), which generated habitat loss, competition, and predation on frogs (Fox et al. 2005; Cuello and Perotti 2006; Ortubay et al. 2006). In addition, the appearance of clinical signs of *Ranavirus* sp. and *Batrachochytrium dendrobatidis* (Ghirardi et al. 2014), two pathogens frequently associated with the global decline of amphibians, was recorded for this species by Fox et al. (2006). For these reasons, *A. patagonicus* is currently categorized as Critically Endangered (IUCN SSC Amphibian Specialist Group 2019).

Of the 17 National Parks in Patagonia (<https://www.argentina.gob.ar/parquesnacionales>), LBNP is the second smallest (Úbeda and Grigera 2007), but it harbors approximately 20% of the species of reptiles (Abdala et al. 2012b) and snakes (Giraudó et al. 2012) and 30% of the amphibian species found in Neuquén province (Vaira et al. 2012). While species lists for reptiles exist for other Patagonian provinces such as Rio Negro (Pérez et al. 2011) and Chubut (Minoli et al. 2015), there is currently none available for the province of Neuquén. This is the first herpetofauna species list for a national park in Patagonia. Brizio et al. (2023) identified 16 reptile species in the Auca Mahuida Natural Protected Area, also located in the province of Neuquén. Despite being located about 200 km from LBNP, only four species are shared in both areas (*Diplolaemus sexcinctus*, *Leiosaurus bellii*, *Homonota darwini*, and *Bothrops ammodytoides*), which is probably due to the fact that the Auca Mahuida Natural Protected Area encompasses the phytogeographical provinces of the Monte and Patagonia.

Of the 18 species recorded in our study, 7 are designated as “Species of Vertebrates of Special Value” (*A. patagonicus*, *A. praebasalticus*, *B. ammodytoides*, *P. araucanus*, *L. sagei*, *P. querque*, and *P. zapalensis*; Administración de Parques Nacionales 1994), constituting nearly 40% of the total herpetofauna found in the park. This designation is because they are in some category of threat, are endemic or specialists, or have a limited presence within the National System of Protected Areas. Given this situation, conservation efforts are imperative to protect these species and mitigate their threats. The ecological restoration of the Laguna Blanca stands as one of the primary objectives outlined in the current management plan of LBNP through continuous fishing (Administración de Parques Nacionales 2017). We recommend implementing measures to control livestock activities since cattle trample the shores, and we found the greatest herpetofauna diversity closely linked to the lagoons and their surrounding areas. The park has already carried out the fencing of some lagoons (Batea, Verde, and Antiñir), but cattle sometimes breach these barriers (pers. obs.). All of these actions are crucial for the restoration of the habitat and the preservation of the unique biodiversity within the park.

Our findings provide a starting point for future studies to explore additional aspects of the existing herpetofauna. While there are papers on certain biological aspects (Boretto and Ibargüengoytía 2009; Duran et al. 2018; Cabezas-Cartes et al. 2023), assessments at the status and population trend levels, particularly for reptiles, remain limited. In the case of amphibians, the most endangered species, *A. patagonicus*, has been the subject of ongoing research and various management actions in recent years (Cuello et al. 2008; Cuello et al. 2009; Cuello et al. 2017). Checklists are dynamic, reflecting the current state of knowledge at a specific moment (Rivas et al. 2012). Ongoing reports of new species, synonymizations, and other taxonomic changes are continually reshaping our understanding of biological diversity. To further validate the presence of probable species in the area, more exhaustive sampling across different seasons and sites not previously frequented will be necessary.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

Conceptualization: MCJR. Data curation: LJA, DGV, MCJR, FLDLS. Formal analysis: MCJR. Funding acquisition: MCJR, FPK. Investigation: RC, FLDLS, DGV, MCJR. Methodology: GT, MCJR. Project administration: MCJR. Resources: FPK. Supervision: FPK, DGV, JDW. Visualization: RC. Writing - original draft: MCJR. Writing - review and editing: FPK, MH, MAV, DODP.

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Data availability

All of the data that support the findings of this study are available in the main text.

References

- Abdala CS, Semhan RV, Moreno Azócar DL, Bonino MF, Paz MM, Cruz FB (2012a) Taxonomic study and morphology based phylogeny of the patagonic clade *Liolaemus melanops* group (Iguania: Liolaemidae), with the description of three new taxa. *Zootaxa* 3163: 1–32. <https://doi.org/10.11646/zootaxa.3163.1.1>
- Abdala CS, Acosta JL, Acosta JC, Álvarez BB, Arias F, Avila LJ, Blanco MG, Bonino M, Boretto JM, Brancatelli G, Breitman MF, Cabrera MR, Cairo S, Corbalán V, Hernando A, Ibargüengoytía NR, Kacoliris F, Laspiur A, Montero R, Morando M, Pelegrin N, Fulvio Pérez CH, Quinteros AS, Semhan RV, Tedesco ME, Vega L, Zalba SM (2012b) Categorización del estado de conservación de las lagartijas y anfisbenas de la República Argentina. *Cuadernos de Herpetología* 26(1): 215–247.

- Abdala CS, Laspiur A, Scrocchi G, Semham RV, Lobo F, Valladares P (2021) Las Lagartijas de la Familia Liolemidae. Sistemática, distribución e historia natural de una de las familias más diversas del cono sur de Sudamérica. Volumen 2. Santiago, Universidad de Tarapaca, 496 pp.
- Administración de Parques Nacionales (1994) Resolución 180/94: lista de vertebrados de valor especial. Parques Nacionales, Reservas Nacionales y Monumentos Naturales Patagónicos, Buenos Aires, Argentina.
- Administración de Parques Nacionales (1999) Ecoregiones de la Argentina. Secretaría de Recursos Naturales y Desarrollo Sustentable, Administración de Parques nacionales. Buenos Aires, Argentina.
- Administración de Parques Nacionales (2017) Plan de Gestión Parque Nacional Laguna Blanca. ResHD. 476/17.
- Avila LJ (2009) Reptilia, Squamata, Dipsadidae, *Pseudotomodon trigonatus* (Leybold, 1873): Distribution extension. Check List 5(3): 191–193. <https://doi.org/10.15560/5.3.391>
- Avila LJ, Martínez LE, Morando M (2013) Checklist of lizards and amphisbaenians of Argentina: An update. Zootaxa 3616(3): 201–238. <https://doi.org/10.11646/zootaxa.3616.3.1>
- Böhm M, Williams R, Bramhall HR, McMillan KM, Davidson AD, Garcia A, Bland LM, Bielby J, Collen B (2016) Correlates of extinction risk in squamate reptiles: The relative importance of biology, geography, threat and range size. Global Ecology and Biogeography 25(4): 391–405. <https://doi.org/10.1111/geb.12419>
- Bonvissuto GL, Somlo RC, Lanciotti ML, Carteau AG, Busso CA (2008) Guías de condición para pastizales naturales de “Precordillera”, “Sierras y Mesetas” y “Monte Austral” de Patagonia. INTA EEA Bariloche, 48 pp.
- Boretto JM, Ibargüengoytía NR (2009) *Phymaturus* of Patagonia, Argentina: Reproductive biology of *Phymaturus zapalensis* (Liolaemidae) and a comparison of sexual dimorphism within the genus. Journal of Herpetology 43(1): 96–104. <https://doi.org/10.1670/07-241R2.1>
- Brizio M, Minoli I, Pérez D, Avila L (2023) Reptiles of the Auca Mahuida Natural Protected Area, Argentina. Revista Del Museo Argentino De Ciencias Naturales Nueva Serie, 25(1): 133–142. <https://doi.org/10.22179/REVMACN.25.801>
- Butchart SHM, Walpole M, Collen B, van Strien A, Scharlemann JP, Almond RE, Baillie JE, Bomhard B, Brown C, Bruno J, Carpenter KE, Carr GM, Chanson J, Chenery AM, Csirke J, Davidson NC, Dentener F, Foster M, Galli A, Galloway JN, Genovesi P, Gregory RD, Hockings M, Kapos V, Lamarque JF, Leverington F, Loh J, McGeoch MA, McRae L, Minasyan A, Hernández Morcillo M, Oldfield TE, Pauly D, Quader S, Revenga C, Sauer JR, Skolnik B, Spear D, Stanwell-Smith D, Stuart SN, Symes A, Tierney M, Tyrrell TD, Vié JC, Watson R (2010) Global biodiversity: Indicators of recent declines. Science 328(5982): 1164–1168. <https://doi.org/10.1126/science.1187512>
- Cabezas-Cartes F, Kubisch EL, Duran F, Boretto JM (2023) Comparative thermal sensitivity of locomotor performance and vulnerability to global warming of two sympatric *Phymaturus* lizards from cold environments of Patagonia (Argentina). Biological Journal of the Linnean Society. Linnean Society of London 140(2): 261–276. <https://doi.org/10.1093/biolinnean/blad064>
- Cei JM, Roig VG (1968) Telmatobiinos de las lagunas basálticas de Neuquén (Anura, Leptodactylidae). Physis (Rio de Janeiro, Brazil) 27: 265–284.
- Cei JM, Scolaro JA, Videla F, Cei JM, Scolaro JA (2001) The present status of Argentinean polychrotid species of the genus *Pristidactylus* and description of its southern-

- most taxon as a new species. *Journal of Herpetology* 35(4): 597–605. <https://doi.org/10.2307/1565897>
- Cei JM, Scolaro JA, Videla F (2003) A taxonomic revision of recognized Argentine species of the leiosaurid genus *Diplolaemus* (Reptilia, Squamata, Leiosauridae). *Facena* 19: 137–155. <https://doi.org/10.30972/fac.1905510>
- Cei JM, Scolaro JA, Videla F (2004) An updated biosystematic approach to the leiosaurid genus *Pristidactylus*. *Bollettino del Museo Regionale di Scienze Naturali di Torino* 21(1): 159–192.
- Chebez JC, Rey NR, Williams JD (2005) Reptiles de los Parques Nacionales de la Argentina. Monografía LOLA, Buenos Aires, 76 pp.
- Christie ML (2002) *Liolaemus lineomaculatus* (Sauria: Liolaemidae) en el noroeste patagónico. *Cuadernos de Herpetología* 16(1): 83–87.
- Cibils AF, Borrelli PR (2005) Grasslands of Patagonia. In: Suttie JM, Reynolds SG, Batello C (Eds) *Grasslands of the World*. FAO, Rome, 121–170.
- Conti HA (1998) Características climáticas de la Patagonia. In: Correa MN (Ed.) *Flora Patagónica*, Buenos Aires, 31–47.
- Cruz F, Belver L, Acosta JC, Villavicencio HJ, Blanco G, Cánovas MG (2009) Thermal biology of *Phymaturus* lizards: evolutionary constraints or lack of environmental variation? *Zoology* 112(6): 425–432. <https://doi.org/10.1016/j.zool.2009.03.004>
- Cuello ME, Perotti MG (2006) Decline of the endemic frog *Atelognathus patagonicus* from Laguna Blanca, Neuquén, Argentina: assessment of the effect of fish introduction. *Froglog*, Newsletter of the Declining Amphibian Populations Task Force 73: 1–2.
- Cuello ME, Úbeda CA, Bello MT (2008) Relationship between morphotypes of *Atelognathus patagonicus* (Anura, Neobatrachia) and environmental conditions: Evidence and possible explanation. *Phyllomedusa* 7(1): 35–44. <https://doi.org/10.11606/issn.2316-9079.v7i1p35-44>
- Cuello ME, Perotti MG, Iglesias GJ (2009) Dramatic decline and range contraction of the endangered Patagonian frog *Atelognathus patagonicus* (Anura, Leptodactylidae). *Oryx* 43(3): 443–446. <https://doi.org/10.1017/S0030605308000148>
- Cuello ME, Úbeda CA, Bello MT, Perotti MG (2014) Plastic patterns in larval development of Endangered endemic *Atelognathus patagonicus*: Implications for conservation strategies. *Endangered Species Research* 23(1): 83–92. <https://doi.org/10.3354/esr00550>
- Cuello ME, Úbeda CA, Bello MT (2017) Habitat associations for the endangered frog *Atelognathus patagonicus* within the aquatic environment: Key microhabitats for conservation. *Herpetological Conservation and Biology* 12(2): 410–421.
- Daciuk J (1968) La fauna del Parque Nacional Laguna Blanca (Estudio zoo-ecológico preliminar). *Anales de Parques Nacionales* XI(2): 225–304.
- Droege S, Cyr A, Larivée J (1998) Checklists: An Under-Used Tool for the Inventory and Monitoring of Plants and Animals. *Conservation Biology* 12(5): 1134–1138. <https://doi.org/10.1046/j.1523-1739.1998.96402.x>
- Duran F, Kubisch EL, Boretto JM (2018) Thermal physiology of three sympatric and syntopic Liolaemidae lizards in cold and arid environments of Patagonia (Argentina). *Journal of Comparative Physiology. B, Biochemical, Systemic, and Environmental Physiology* 188(1): 141–152. <https://doi.org/10.1007/s00360-017-1116-3>
- Escobar L (2011) Efecto de clausuras de ganado en la recuperación de la vegetación en el Parque Nacional Laguna Blanca. Tesis de Licenciatura, Universidad Nacional del Comahue, San Carlos de Bariloche, 98 pp.
- Etheridge R, Christie MI (2003) Two new species of the lizard genus *Liolaemus* (Squamata: Liolaemidae) from northern Patagonia, with comments on *Liolaemus rothi*.

- Journal of Herpetology 37(2): 325–341. [https://doi.org/10.1670/0022-1511\(2003\)037\[0325:TNSOTL\]2.0.CO;2](https://doi.org/10.1670/0022-1511(2003)037[0325:TNSOTL]2.0.CO;2)
- Fox SF, Yoshioka JH, Cuello ME, Úbeda C (2005) Status, distribution, and ecology of an endangered semi-aquatic frog (*Atelognathus patagonicus*) of northwestern Patagonia, Argentina. *Copeia* 2005(4): 921–929. [https://doi.org/10.1643/0045-8511\(2005\)005\[0921:SDAEOA\]2.0.CO;2](https://doi.org/10.1643/0045-8511(2005)005[0921:SDAEOA]2.0.CO;2)
- Fox SF, Greer AL, Torres-Cervantes R, Collins JP (2006) First case of ranavirus-associated morbidity and mortality in natural populations of the South American frog *Atelognathus patagonicus*. *Diseases of Aquatic Organisms* 72(1): 87–92. <https://doi.org/10.3354/dao072087>
- Frost DR (2023) Amphibian Species of the World: an Online Reference. Version 6.2 (Date of access). Electronic Database accessible at <https://amphibiansoftheworld.amnh.org/index.php>. American Museum of Natural History, New York, USA. <https://doi.org/10.5531/db.vz.0001> [Accessed on 16 August 2023]
- Gallardo JM (1962) Los géneros *Telmatobius* y *Batrachophrynus* (Amphibia, Leptodactylidae) en la Argentina. *Neotrópica* 8(26): 45–58.
- Ghirardi R, Levy MG, López JA, Corbalán V, Steciow MM, Perotti MG (2014) Endangered amphibians infected with the chytrid fungus *Batrachochytrium dendrobatidis* in austral temperate wetlands from Argentina. *The Herpetological Journal* 24(2): 129–133.
- Gibbons JW, Scott DE, Ryan TJ, Buhlmann KA, Tuberville TD, Metts BS, Greene JL, Mills T, Leiden Y, Poppy S, Winne CT (2000) The Global Decline of Reptiles, Déjà Vu Amphibians: Reptile species are declining on a global scale. Six significant threats to reptile populations are habitat loss and degradation, introduced invasive species, environmental pollution, disease, unsustainable use, and global climate change. *Bioscience* 50(8): 653–666. [https://doi.org/10.1641/0006-3568\(2000\)050\[0653:TGDORD\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2000)050[0653:TGDORD]2.0.CO;2)
- Giraudó AR, Arzamendia V, Bellini GP, Bessa CA, Calamante CC, Cardozo G, Chiaraviglio M, Costanzo MB, Etchepare EG, Di Cola V, Di Pietro DO, Kretzschmar S, Palomas S, Nenda SJ, Rivera PC, Rodríguez ME, Scrocchi GJ, Williams JD (2012) Categorización del estado de conservación de las Serpientes de la República Argentina. *Cuadernos de Herpetología* 26: 303–326.
- Ibargüengoytía NR, Acosta JC, Boretto JM, Villavicencio HJ, Marinero JA, Krenz JD (2008) Field thermal biology in *Phymaturus* lizards: Comparisons from the Andes to the Patagonian steppe in Argentina. *Journal of Arid Environments* 72(9): 1620–1630. <https://doi.org/10.1016/j.jaridenv.2008.03.018>
- IUCN SSC Amphibian Specialist Group (2019) *Atelognathus patagonicus*. The IUCN Red List of Threatened Species 2019: e.T56323A101427111. <https://doi.org/10.2305/IUCN.UK.2019-1.RLTS.T56323A101427111.en> [Accessed on 16 August 2023]
- Kacoliris FP, Berkunsky I, Acosta JC, Acosta R, Agostini MG, Akmentins MS, Arellano ML, Azat C, Bach NC, Blanco GM, Calvo R, Charrier A, Corbalán V, Correa C, Cuello ME, Deutsch C, Di Pietro DO, Gastón MS, Gómez-Alés R, Kass C, Kass N, Lobos G, Martínez TA, Martínez-Aguirre T, Mora M, Nieva-Cocilio R, Pastore H, Pérez-Iglesias JM, Piaggio-Kokot L, Rabanal F, Rodríguez-Muñoz MJ, Sanchez LC, Tala C, Úbeda C, Vaira M, Velasco MA, Vidal M, Williams JD (2022) Current threats faced by amphibian populations in the southern cone of South America. *Journal for Nature Conservation* 69: 126254. <https://doi.org/10.1016/j.jnc.2022.126254>
- Lamoreux JF, Morrison JC, Ricketts TH, Olson DM, Dinerstein E, McKnight MW, Shugart HH (2006) Global tests of biodiversity concordance and the importance of endemism. *Nature* 440(7081): 212–214. <https://doi.org/10.1038/nature04291>

- Lobo F, Abdala C, Valdecantos S (2010) Taxonomic studies of the genus *Phymaturus* (Iguania: Liolaemidae): description of four new species. *South American Journal of Herpetology* 5(2): 102–126. <https://doi.org/10.2994/057.005.0205>
- Marcolín A (1968) Estudio geológico preliminar del Parque Nacional Laguna Blanca. In *Anales de Parques Nacionales*. Volumen 11, Buenos Aires, 99–127.
- Martinazzo Giménez LB (2011) Sistemática, filogenia y filogeografía de las ranas patagónicas *Atelognathus patagonicus* y *Atelognathus praebasalticus*. PhD Thesis, Universidad Nacional de La Plata, 124 pp.
- Minoli I, Morando M, Avila LJ (2015) Reptiles of Chubut province, Argentina: Richness, diversity, conservation status and geographic distribution maps. *ZooKeys* 498: 103–126. <https://doi.org/10.3897/zookeys.498.7476>
- Montero R (1996) Lista de las localidades de los Amphisbaenidae de la República Argentina. *Cuadernos de Herpetología* 10(1–2): 25–45.
- Montero R (2016) On the Validity of Several Argentinian Species of *Amphisbaena* (Squamata, Amphisbaenidae). *Journal of Herpetology* 50(4): 642–653. <https://doi.org/10.1670/15-048>
- Morando M, Avila LJ (2020) Lizards of Patagonia: Diversity, systematics, biogeography and biology of the reptiles at the end of the world. Springer Nature, 432 pp. <https://doi.org/10.1007/978-3-030-42752-8>
- Morello J, Matteucci SD, Rodríguez AF, Silva ME (2012) Ecorregiones y complejos ecosistémicos argentinos. Orientación Gráfica Editora, Buenos Aires, 752 pp.
- Ortubay S, Cussac V, Battini M, Barriga J, Aigo J, Alonso M, Macchi P, Reissig M, Yoshioka J, Fox S (2006) Is the decline of birds and amphibians in a steppe lake of northern Patagonia a consequence of limnological changes following fish introduction? *Aquatic Conservation* 16(1): 93–105. <https://doi.org/10.1002/aqc.696>
- Oyarzabal M, Clavijo J, Oakley L, Biganzoli F, Tognetti P, Barberis I, Maturo HM, Aragón R, Campanello PI, Prado D, Oesterheld M, León RJ (2018) Unidades de vegetación de la Argentina. *Ecología Austral* 28(1): 40–63. <https://doi.org/10.25260/EA.18.28.1.0.399>
- Paz Barreto D (2018) Registro de Aves del Parque Nacional Laguna Blanca de 1951 a 2018. Informe Técnico Parque Nacional Laguna Blanca, Administración de Parques Nacionales, Zapala, Neuquén, 25 pp.
- Péfaur JE, Duellman WE (1980) Community structure in high Andean herpetofaunas. *Transactions of the Kansas Academy of Science* (1903-) 83(2): 45–65. <https://doi.org/10.2307/3627715>
- Pérez CHF, Frutos N, Kozykariski M, Morando M, Perez DR, Avila LJ (2011) Lizards of Rio Negro Province, northern Patagonia, Argentina. *Check List* 7(3): 202–219. <https://doi.org/10.15560/7.3.202>
- Pérez CHF, Medina CD, Ávila LJ (2012) *Clelia rustica* (Jan, 1863) (Serpentes: Dipsadidae): Distribution extensión. *Check List* 8(4): 796–797. <https://doi.org/10.15560/8.4.796>
- Pincheira-Donoso D, Scolaro JA (2007) Iguanian species-richness in the Andes of boreal Patagonia: evidence for an additional new *Liolaemus* lizard from Argentina lacking precloacal glands (Iguania, Liolaeminae). *Zootaxa* 1452: 55–69.
- Pincheira-Donoso D, Scolaro JA (2007) Iguanian species-richness in the Andes of boreal Patagonia: evidence for an additional new *Liolaemus* lizard from Argentina lacking precloacal glands (Iguania, Liolaeminae). *Zootaxa* 1452: 55–69. <https://doi.org/10.11646/zootaxa.1452.1.4>
- Ramilo E, Chehébar C, Mazzuchelli S (1993) Plan General de Manejo del Parque Nacional Laguna Blanca. Administración de Parques Nacionales, delegación Técnica Regional Patagonia.

- Rivas GA, Molina CR, Ugueto GN, Barros TR, Barrio-Amorós CL, Kok PJR (2012) Reptiles of Venezuela: An updated and commented checklist. *Zootaxa* 3211(1): 1–64. <https://doi.org/10.11646/zootaxa.3211.1.1>
- Santos Gollan J (1951) Un refugio de aves acuáticas. *El Parque Nacional Laguna Blanca*. *El Hornero* 9(3): 280–287. <https://doi.org/10.56178/eh.v9i3.1367>
- Scolaro JA (2005) Reptiles Patagónicos sur: una guía de campo. Universidad Nacional de la Patagonia San Juan Bosco, 80 pp.
- Scolaro JA (2006) Reptiles patagónicos norte: una guía de campo. Universidad Nacional de la Patagonia San Juan Bosco, 112 pp.
- Úbeda C, Grigera D (2007) El grado de protección de los anfibios patagónicos de Argentina. *Ecología Austral* 17(2): 269–279.
- Uetz P, Freed P, Hošek J [Eds] (2023) The Reptile Database. <http://www.reptile-database.org> [Accessed on: 16 August 2023].
- Vaira M, Akmentins M, Attademo M, Baldo D, Barrasso D, Barrionuevo S, Basso NG, Blotto BL, Cairo S, Cajade R, Céspedes JA, Corbalán V, Chilote P, Duré MI, Falcione AC, Ferraro DP, Gutiérrez R, Ingaramo M, Junges C, Lajmanovich RC, Lescano J, Marangoni F, Martinazzo Giménez LB, Marti R, Moreno L, Natale GS, Pérez Iglesias JM, Peltzer PM, Quiroga LB, Rosset SD, Sanabria EA, Sánchez L, Schaefer EF, Úbeda C, Zaracho V (2012) Categorización del estado de conservación de los anfibios de la República Argentina. *Cuadernos de Herpetología* 26: 131–159.
- Vaira M, Pereyra LC, Akmentins MS, Bielby J (2017) Conservation status of amphibians of Argentina: An update and evaluation of national assessments. *Amphibian and Reptile Conservation* 11(1): 36–44. [e135]
- Vera DG, Nigro R, Berkunsky I, Fortunato D, Velasco M, Quiroga S, Povedano H, Williams J, Tettamanti G, Kacoliris F, Di Pietro D (2023) Serpientes de Chipauquil, Meseta de Somuncura, Patagonia Argentina. *Revista Latinoamericana de Herpetología* 6(4): e790 (114 – 119). <https://doi.org/10.22201/fc.25942158e.2023.4.790>
- Williams JD, Vera DG (2023) Serpientes de la Argentina. LBN Ediciones, Buenos Aires, 351 pp.
- Williams JD, Vera DG, Di Pietro DO (2021) Lista comentada de las serpientes de la Argentina, con referencias a su sistemática, distribución geográfica, dieta, reproducción, potencial peligrosidad y etimologías. *Revista del Museo de La Plata* 6(1): 26–124. <https://doi.org/10.24215/25456377e142>